# EXHIBIT 28

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# Reserved IP addresses

In the Internet addressing architecture, the Internet Engineering Task Force (IETF) and the Internet Assigned Numbers Authority (IANA) have reserved various Internet Protocol (IP) addresses for special purposes.[1]

## Contents

## IPv4

There are a number of addresses with special meaning in IPv4:[1]

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Special address blocks

| Address block | Address range | Number of addresses | Scope | Description |
|---|---|---|---|---|
| 0.0.0.0/8 | 0.0.0.0–0.255.255.255 | 16 777 216 | Software | Current network[1] (only valid as source address). |
| 10.0.0.0/8 | 10.0.0.0–10.255.255.255 | 16 777 216 | Private network | Used for local communications within a private network.[2] |
| 100.64.0.0/10 | 100.64.0.0–100.127.255.255 | 4 194 304 | Private network | Shared address space[3] for communications between a service provider and its subscribers when using a carrier-grade NAT. |
| 127.0.0.0/8 | 127.0.0.0–127.255.255.255 | 16 777 216 | Host | Used for loopback addresses to the local host.[1] |
| 169.254.0.0/16 | 169.254.0.0–169.254.255.255 | 65 536 | Subnet | Used for link-local addresses[4] between two hosts on a single link when no IP address is otherwise specified, such as would have normally been retrieved from a DHCP server. |
| 172.16.0.0/12 | 172.16.0.0–172.31.255.255 | 1 048 576 | Private network | Used for local communications within a private network.[2] |
| 192.0.0.0/24 | 192.0.0.0–192.0.0.255 | 256 | Private network | IETF Protocol Assignments.[1] |
| 192.0.2.0/24 | 192.0.2.0–192.0.2.255 | 256 | Documentation | Assigned as TEST-NET-1, documentation and examples.[5] |
| 192.88.99.0/24 | 192.88.99.0–192.88.99.255 | 256 | Internet | Reserved.[6] Formerly used for IPv6 to IPv4 relay[7] (included IPv6 address block 2002::/16). |
| 192.168.0.0/16 | 192.168.0.0–192.168.255.255 | 65 536 | Private network | Used for local communications within a private network.[2] |
| 198.18.0.0/15 | 198.18.0.0–198.19.255.255 | 131 072 | Private network | Used for benchmark testing of inter-network communications between two separate subnets.[8] |
| 198.51.100.0/24 | 198.51.100.0–198.51.100.255 | 256 | Documentation | Assigned as TEST-NET-2, documentation and examples.[5] |

| 203.0.113.0/24 | 203.0.113.0–203.0.113.255 | 256 | Documentation | Assigned as TEST-NET-3, documentation and examples.[5] |
| 224.0.0.0/4 | 224.0.0.0–239.255.255.255 | 268 435 456 | Internet | In use for IP multicast.[9] (Former Class D network). |
| 240.0.0.0/4 | 240.0.0.0–255.255.255.254 | 268 435 456 | Internet | Reserved for future use.[10] (Former Class E network). |
| 255.255.255.255/32 | 255.255.255.255 | 1 | Subnet | Reserved for the "limited broadcast" destination address.[1][11] |

# IPv6

There are a number of addresses with special meaning in IPv6:[1]

Special address blocks

| Address block (CIDR) | First address | Last address | Number of addresses | Usage | Purpose |
|---|---|---|---|---|---|
| ::/0 | :: | ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff | $2^{128}$ | Routing | Default route. |
| ::/128 | :: | | 1 | Software | Unspecified address. |
| ::1/128 | ::1 | | 1 | Host | Loopback address to the local host. |
| ::ffff:0:0/96 | ::ffff:0.0.0.0 | ::ffff:255.255.255.255 | $\dfrac{2^{128-96} = 2^{32}}{= 4\,294\,967\,296}$ | Software | IPv4 mapped addresses. |
| ::ffff:0:0:0/96 | ::ffff:0.0.0.0.0 | ::ffff:0:255.255.255.255 | $2^{32}$ | Software | IPv4 translated addresses. |
| 64:ff9b::/96 | 64:ff9b::0.0.0.0 | 64:ff9b::255.255.255.255 | $2^{32}$ | Global Internet | IPv4/IPv6 translation.[12] |
| 100::/64 | 100:: | 100::ffff:ffff:ffff:ffff | $2^{64}$ | Routing | Discard prefix.[13] |
| 2001::/32 | 2001:: | 2001::ffff:ffff:ffff:ffff:ffff:ffff | $2^{96}$ | Global Internet | Teredo tunneling. |
| 2001:20::/28 | 2001:20:: | 2001:2f:ffff:ffff:ffff:ffff:ffff:ffff | $2^{100}$ | Software | ORCHIDv2.[14] |
| 2001:db8::/32 | 2001:db8:: | 2001:db8:ffff:ffff:ffff:ffff:ffff:ffff | $2^{96}$ | Documentation | Addresses used in documentation and example source code.[15] |
| 2002::/16 | 2002:: | 2002:ffff:ffff:ffff:ffff:ffff:ffff:ffff | $2^{112}$ | Global Internet | The 6to4 addressing scheme (now deprecated).[6] |
| fc00::/7 | fc00:: | fdff:ffff:ffff:ffff:ffff:ffff:ffff:ffff | $2^{121}$ | Private network | Unique local address.[16] |
| fe80::/10 | fe80:: | febf:ffff:ffff:ffff:ffff:ffff:ffff:ffff | $2^{118}$ | Link | Link-local address. |
| ff00::/8 | ff00:: | ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff | $2^{120}$ | Global Internet | Multicast address. |

## See also

- Bogon filtering
- Martian packet
- Classless Inter-Domain Routing (CIDR)
- Top-level domain § Reserved domains

## References

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## External links

- IANA IPv4 Special-Purpose Address Registry (https://www.iana.org/assignments/iana-ipv4-special-registry/iana-ipv4-special-registry.xhtml)

- IANA IPv6 Special-Purpose Address Registry (https://www.iana.org/assignments/iana-ipv6-special-registry/iana-ipv6-special-registry.xhtml)

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**This page was last edited on 26 July 2019, at 18:04 (UTC).**